

CLAIMS

1. A method of delivering a sensing and utility device to a target location in the gastrointestinal tract comprising the steps of:

generating a map of the gastrointestinal tract employing a sensing and utility device for a first pass through the gastrointestinal tract; and delivering said sensing and utility device to a target location identified on said map using said sensing and delivering device in a second pass.

2. The method according to claim 1 wherein the sensing and delivering device is a capsule comprising;

sensing means for generating data in a first and second pass through the gastrointestinal tract;

means for signal analysis of the data generated in the first and second pass;

means for controlling the sensing and utility device according to said signal analysis; and

means for performing a job in the gastrointestinal tract.

3. The method according to claim 1 wherein the step of generating a map of the gastrointestinal tract comprises the steps of :

inserting the sensing and utility device into the gastrointestinal tract;

locating said sensing and utility device; and
displaying the location on a position monitor.

4. The method according to claim 3 further comprising a step of displaying the location of the device two or three dimensionally.

5 5. The method according to claim 4 wherein the location of the device is displayed as an overlay to a schematic presentation of the gastrointestinal tract.

6. The method according to claim 1 wherein the step of delivering the sensing and utility device to a target location identified on the map generated in the first pass, comprises the steps of :

10 inserting the sensing and utility device into the gastrointestinal tract, in a second pass;

receiving data from said sensing and utility device;

15 performing signal analysis of the data generated in the first pass and of the data generated in the second pass; and

controlling said sensing and utility device according to said signal analysis.

7. The method according to claim 1 wherein the first pass and second pass are one or more passes.

20 8. The method according to claim 1 wherein the target location is a location of a pathology.

9. A sensing and utility device for performing a job at a target location in a gastrointestinal tract comprising:

sensing means for generating data in a first and second pass through the gastrointestinal tract;

5 means for signal analysis of the data generated in the first and second pass;

means for performing a job in the gastrointestinal tract; and

means for controlling the sensing and utility device and the means for performing a job, operable according to said signal analysis.

- 10 10. The device according to claim 9 wherein the sensing means sense parameters of the gastrointestinal tract in a first and second pass and wherein the means for signal analysis analyze the sensed parameters.

11. The device according to claim 10 wherein the means for controlling the sensing and utility device are operable according to the analysis of the sensed parameters in the first and second pass.

12. The device according to claim 9 wherein the means for performing a job in the gastrointestinal tract are selected from means for releasing substances into the gastrointestinal tract and means for collecting substances from the gastrointestinal tract.

- 20 13. A system for delivering a sensing and utility device to a target location in the gastrointestinal tract comprising:

a sensing and utility device consisting of:

a camera system;

an optical system for sensing an area of interest onto said camera system;

a transmitter which transmits video output of said camera system; and

means for performing a job in the gastrointestinal tract;

a reception system which receives said transmitted video output, said reception system comprising;

an antenna array capable of surrounding a body and comprising a plurality of antennas for receiving said transmitted video output and for producing a plurality of received signals;

a demodulator capable of transforming said plurality of received video signals into a single video data stream; and

a data processing system which generates tracking and video data from said single data stream;

and

an analyzing unit for signal analysis of said video output and for controlling the sensing and utility device.

14. The system according to claim 13 wherein the sensing and utility device is swallowable.

15. The system according to claim 13 wherein the sensing and utility device is placeable in the gastrointestinal tract.

16. A storage compartment, enclosed in a sensing and utility device, for releasing and collecting substances to and from the gastrointestinal tract, having an inflexible barrier as a first wall, and said device shell as a second wall, said second wall opposing said first wall, and comprising:

5 a flexible pouch for retaining said substances, said pouch encased within said inflexible barrier and device shell;

a bi stable spring attached to the inflexible barrier, at one end, and to the flexible pouch at another end, for controlling the pouch bulk; and

10 means for changing the bi stable spring configuration, for extending the spring to decrease pouch bulk and for recoiling the spring to increase pouch bulk.

17. The storage compartment according to claim 16 further comprising a firm diaphragm, having elasticity which enables it to accommodate to a device shape, and which is horizontally movable between the inflexible barrier and device shell, said diaphragm situated at the attachment site of the bi stable spring and the flexible pouch, and attached to both flexible pouch and bi stable spring, for pushing or pulling the flexible pouch relatively to the compartment walls.

18. The storage compartment according to claim 17 further comprising means for rupturing the flexible pouch for releasing a substance from said pouch to a patient's gastrointestinal tract and for collecting into said pouch substances from a patient's gastrointestinal tract.

19. The storage compartment according to claim 18 wherein the device shell contains an area which is permeable to the released and collected substance.

20. The storage compartment according to claim 19 wherein the means for rupturing the flexible pouch is a pin, said pin being attached to a first pouch wall while protruding in the direction of a second pouch wall, said second pouch wall being opposed to said first pouch wall, and wherein the pin is thrust into the second pouch wall to rupture it for releasing a substance from the pouch.

21. The storage compartment according to claim 19 wherein the means for rupturing the flexible pouch is a pin, said pin being attached to a first pouch wall while being lodged in a second pouch wall, said second pouch wall being opposed to first pouch wall, and wherein, for collecting a substance into the pouch, the pin is dislodged from the second pouch wall and moved in the direction of the first pouch wall, rupturing said second pouch wall.

22. The storage compartment according to claims 20 and 21 further comprising a space between the second pouch wall and the device shell for containing a pin tip protruding through the second pouch wall, for protecting a patient's gastrointestinal tract from the protruding pin tip.

23. Use of the method according to claim 1 for research, diagnostic or therapeutic purposes.